

REMARKS

The enclosed is responsive to the Examiner's Office Action mailed on April 28, 2009. At the time the Examiner mailed the Office Action, claims 1-4, 6-16 and 43 were pending. By way of the present response applicants have: 1) amended claims 1, 2, and 4; and 2) added no claims; and 3) canceled no claims. No new matter has been added. Reconsideration of this application as amended is respectfully requested.

35 U.S.C. § 112 Rejections

Claim 1 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the inclusion of the term "such as." Applicants have removed "such as" from claim 1 and, therefore, submit that the rejection has been overcome.

Claims 2 and 4 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the inclusion of the term "allowance is made for ... characteristics in predicting engine speed change." Applicants have amended claims 2 and 4 to recite "... characteristics are included in predicting engine speed change" to clarify the claimed subject matter. Accordingly, applicants submit that the rejection of claims 2 and 4 has been overcome.

Claim Rejections – 35 U.S.C. § 103

Claims 1-4, 6, 8-16 and 43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,521,819 by Greenwood, (hereinafter, "Greenwood") in view of European Patent No. EP 0 925 992 A2 by Nobutaka

(hereinafter, "Nobutaka") and further in view of U.S. Patent No. 4,680,595 by Henry, (hereinafter, "Henry").

Applicants respectfully submit that Greenwood does not teach or suggest a combination with Nobutaka and that Nobutaka does not teach or suggest a combination with Greenwood. The combination of Greenwood and Nobutaka is the result of impermissible hindsight based solely upon the present application.

Greenwood describes a method of controlling a continuously variable ratio transmission including a variator. Nobutaka, however, is concerned with the control of a different type of transmission that teaches away from Greenwood and the subject matter of the present application. Greenwood describes a torque-controlled transmission. Nobutaka describes a ratio-controlled transmission. The two types of transmissions work in very different ways.

Nobutaka states that the "axes of rotation of the rollers are offset by the servo valve system and the stepping motor, which are disclosed in US-A5083473, in response to the ratio actuator command signal." (Nobutaka, paragraph [0065]). The system in Nobutaka includes servo control of the roller inclination (corresponding to variator drive ratio). An electronic input determines where the rollers are to be positioned. The servo valve and stepping motor together sense the actual roller position and adjust it toward the required position. Hence the electronics associated with the transmission can directly set the transmission ratio. (see Nobutaka, paragraphs [0060]-[0065]). One may assume that the control of a vehicle transmission (manual, stepped automatic, or CVT) will involve selecting and directly setting the drive ratio. However, that assumption is not appropriate for a torque-controlled transmission.

In a torque-controlled transmission, the control signal does not directly determine transmission ratio. Instead, it determines the torques created by the variator at its input and output. The variator permits its own ratio to change as the torques it creates, added to externally imposed torques from the engine and wheels, cause the engine and vehicle to accelerate/decelerate. For example, if the vehicle driver applies the brakes to slow the vehicle, the drive ratio provided by the transmission as a whole, and specifically by the variator, will have to change. This could, however, be achieved without any change to the primary control signal – as the vehicle slows, the variator automatically accommodates the resultant change in drive ratio. It goes on creating the reaction torque determined by the primary control signal while the positions of the variator rollers and the resultant ratio vary as necessary.

There are challenges associated with the control of a torque-controlled transmission which do not arise in connection with more conventional transmissions in which direct control is exercised over ratio. For example, when using a ratio-controlled transmission, there is a direct correspondence between vehicle speed and engine speed, as determined by the chosen transmission ratio. Control of the engine speed is thus relatively straightforward. However, engine speed control is wholly different in a torque-controlled transmission. There is no direct way to establish a relationship between engine speed and vehicle speed. Instead, as explained in the present application, engine speed control depends on management of the dynamic balance between torque created by the engine and torque created at the variator input applied to the engine by the variator. A net imbalance between the

two will cause acceleration and failure to manage such an imbalance would result in an uncontrolled variance in engine speed.

Nobutaka describes choosing a target transmission ratio based upon a target engine speed and using a mathematical delay function to adjust the transmission along a controlled path. (see Nobutaka paragraphs [0069]-[0092]). The "inertia torque" can be calculated and the engine setting can be modified so that the application of this inertia torque does not create unwanted deviations in the torque experienced by the driver. Such a process is not carried out with a torque-controlled transmission and is dissimilar from the present application. The control system of the present application does not, in the direct way contemplated by Nobutaka, impose a profile upon changes in transmission ratio. Instead, as described above, a torque-controlled transmission, as described in Greenwood and in the present application, depends upon the management of the dynamic balance of engine torque and loading torque at the engine-transmission interface.

Additionally, applicants respectfully submit that Greenwood does not teach or suggest a combination with Henry and that Henry does not teach or suggest a combination with Greenwood. The combination of Greenwood and Henry is the result of impermissible hindsight based solely upon the present application.

Henry describes an emulation system (a dynamometer) for a motor vehicle drive train. The system in Henry connects directly to the engine - "no transmission is installed between the engine and the dynamometer." (Henry, col. 1, lines 67-68). In its brief consideration of a transmission for the purpose of emulation, Henry describes a conventional multiple gear ratio automatic transmission, not a torque-controlled transmission (Henry, col. 3, lines 2-5).

Even if the references were combined, applicants respectfully submit that that the combination of Greenwood, Nobutaka, and Henry fails to disclose:

determining a target engine acceleration,
determining settings of the variator's primary
control signal and of an engine torque control for
providing the target engine acceleration,
adjusting the variator's primary control signal or
the engine torque control based on these settings,
predicting a consequent engine speed change
resulting from the adjusting the variator's primary control
signal or the engine torque control, and
correcting the settings of the variator's primary
control signal and engine torque based on a comparison
of actual and predicted engine speeds.

(Claim 1).

The Examiner alleges that Greenwood discloses "determining a target engine acceleration" at least at col. 3, lines 22-28 and "determining settings of the variator's primary control signal and of an engine torque control for providing the target engine acceleration" and "adjusting the variator's primary control signal or the engine torque control based on these settings" at least at col. 3, lines 29-67. (Office Action dated 4/28/09, page 4). Applicants respectfully disagree. Greenwood describes a change in engine output torque that will cause the engine to accelerate from one speed to a desired new speed. Greenwood's description is focused on a desired speed, not the determination of a target engine acceleration. Similarly, Nobutaka describes an operator signal from the accelerator pedal being input into a "**target speed** generator." (Nobutaka, paragraph [0069]) (emphasis added). Henry describes a desired (simulated) engine speed, not a target engine acceleration. The combination is focused on adjustments based upon a chosen engine speed target, not determining a target engine acceleration, determining settings of the variator's primary control signal and of an engine torque control for providing the target engine

acceleration, and adjusting the variator's primary control signal or the engine torque control based on these settings.

Furthermore, applicants submit that the references fail to disclose predicting a consequent engine speed change resulting from the adjusting the variator's primary control signal or the engine torque control, and correcting the settings of the variator's primary control signal and engine torque based on a comparison of actual and predicted engine speeds. Greenwood describes comparing instantaneous values of actual engine speed with a desired engine speed, but is silent regarding a prediction of engine speed change resulting from adjusting variator and engine torque controls based upon the target acceleration. The Examiner relies upon Nobutaka paragraphs [0067]-[0069] in the allegation of obviousness. Applicants respectfully submit that Nobutaka is focused on using an actual engine speed and a power request command to generate a throttle position command. Additionally, Nobutaka describes inputting an operator signal from the accelerator pedal and a measure of an actual *vehicle* speed into a target speed generator. Nobutaka does not describe predicting an engine speed change resulting from adjusting variator and engine torque controls based upon the target acceleration. Henry describes predicting a simulated engine speed - i.e., Henry computes an engine speed that would occur if the engine were connected to a drive train and vehicle. Henry, however, deals with a dynamometer in a test environment that simulates a conventional automatic transmission and does not disclose a prediction of engine speed change resulting from adjusting variator and engine torque controls based upon the target acceleration.

Accordingly, applicants submit that the rejection of claim 1 has been overcome. Given that claims 2-4, 6, 8-16, and 43 are dependent upon claim 1, and include additional features, applicants respectfully submit that the rejection of claims 2-4, 6, 8-16, and 43 has been overcome for at least the reasons set forth above.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Greenwood in view of Nobutaka and further in view of Henry and U.S. Patent No. 6,418,366 by Danz, (hereinafter, "Danz").

Given that claim 7 is dependent upon claim 1, and includes additional features, and given that Danz fails to remedy the shortcomings of Greenwood, Nobutaka, and Henry set forth above, applicants respectfully submit that the rejection of claim 7 has been overcome for at least the reasons set forth above.

CONCLUSION

Applicants respectfully submit that in view of the amendments and arguments set forth herein, the applicable objections and rejections have been overcome.

Applicants reserve all rights under the doctrine of equivalents.

Pursuant to 37 C.F.R. 1.136(a)(3), applicants hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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